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Forestry in Pennsylvania.

THE publication of the *Report of the Forestry Commission of Pennsylvania*, being the second part of the Report of the Department of Agriculture for 1895, marks the first serious attempt of a study of the forestry question in Pennsylvania. Whatever has been done previous to this was not only very fragmentary and partial, but was also local. Here, however, we have the first report of a commission appointed in May, 1893, and sent to the Legislature on the 15th of March, 1895. The long delay in publication is presumably not intentional, but is due to the chronic condition in printing state documents, joined to the disastrous fire of over a year ago, the effects of which have not yet been overcome. It is not to be supposed that less than two years would give an exhaustive and complete report of so wide and diversified a state as Pennsylvania, with its sixty-seven counties and 45,000 square miles of area. Nevertheless, we have the beginning of a personal canvass of that portion best fitted for forestry purposes; the results of a number of special inquiries; lists of the trees native to the state, with ample and instructive notes on their character and their economic value and hints as to their propagation, and a very suggestive summing up of forestry prospects, together with recommendations for future policy and effort.

It appears that the so-called forest lands comprise a little less thirty-three per cent. of the state, ranging from about six per cent. in Bucks County to ninety-two in Pike County. But these, as it is truly said, should rather be called waste than forest lands, since they have been in large part cut over, and in many cases are now totally unproductive. This fact is very forcibly brought out by a table of the lands advertised to be sold for taxes during the year 1894. They comprised 2,358 square miles, or about five per cent. of the entire state. They were located in thirty-one of the sixty-seven counties, and varied from a few acres in some to 190,000 in McKean County; comprising, in this latter case, twenty-nine and five-tenths per cent. of the area of the whole county. More or less field-work was done over nearly half the state, the most attention being given to the more mountainous districts and those most closely related to the Delaware and Susquehanna watersheds. It is unfortunate that the time set for the completion of the report did not permit more work of this character, for in no other way can the facts necessary for the proper stating and solution of the problem be obtained. We hope, however, that this may be done in the near future, since a permanent office of forestry commissioner has now been established.

Six tracts, ranging from 200 to 2,000 square miles, are defined as of such nature that they are fitted for forest reserves. They are quite irregular in outline, and each comprises parts of several counties. The Pocono tract, in the north-east, as the source of the Lehigh and other waters draining into the Delaware, and the Lycoming tract, farther west, the source of the bulk of the water of the west branch of the Susquehanna, are specially recommended for this purpose, not only because of their influence on the water-supply, but also because they are unfitted for other profitable use. It is shown that tree-growth is here profuse and recuperation rapid, so that if adequate protection could be afforded reforesting would not be a difficult matter. It is to be hoped that this recommendation may receive due consideration and the commissioner may be authorized to perfect a plan for securing the control and providing for the management of these Reserves. The danger from fires, while frequently mentioned, and the subject of one or two special inquiries, has not, relatively, the space allotted to it that is often given. Presumably this is because no new facts have been discovered in relation to the cause or prevention of these disasters, and it is not worth while to be threshing old straw.

A letter, called "A practical man's experience in timber restoration," gives a concrete illustration of the difficulties that beset efforts to manage a forest property upon common-sense business principles, "owing to the poverty, ignorance, stupidity and crime of the people about it." These people resented efforts in forest restoration as an affront to their vested rights of hunting, berry-picking and pasturing, so that after several years of labor the man who bought 1,200 acres of woodland for the purpose of saving the timber and demonstrating what can be done to develop forest-growth has nothing to show except a heavy bill of expense. He summarizes the whole situation, not only for his case, but for the whole state, by saying, "if the laws could be so amended as to give the landowner proprietary rights in whatever his land produced, whether it be trees, grass, herbs, birds or fishes, and inflict heavy penalties and give damages, . . . then all sorts of trespasses would be quite rare, and in time we might hope to see a decent growth of timber over the thousands of square miles of what is now desert and waste land." We must confess that we do not share the cheerful optimism of this philanthropic citizen, for it ought to be understood that he did not undertake this work so much with the personal expectation of personal profit as to give an object-lesson in forestry for the example of others. Laws will not enforce themselves, and unless there is an educated public opinion behind them they are worse than a dead letter on the books. It appears that this man complained to justices, to district attorneys and to county detectives, but received no help. Of course, it was unfortunate that there was no Justice of the Peace for twenty miles in any direction, but the chief trouble is that courts and juries prefer the old ways and will not consider it an offense or a crime if their neighbors do only what has been the habit of the country from time immemorial.

Forty-seven full-page plates illustrate the report and show some characteristic trees and forest views; they also show by contrast what we have and what we might have, in an exceedingly instructive way. It should be added that Dr. J. T. Rothrock, to whom the bulk of this report is due, is now the Commissioner of Forestry of the state, and has been untiring in his labors for the forestry cause. In the farmers' institutes and at other gatherings he has continued to give illustrated lectures upon the subject. These have proved very popular, and the

leaven thus introduced ought at last to permeate the whole mass of the people and bring about a clearer understanding of what forestry is, and what, when supported by public interest and opinion, it may reasonably be expected to do for the commonwealth. The fact that Pennsylvania has such an officer as Commissioner of Forestry, and that the state publishes and disseminates every year a careful report on the condition of its woodlands, is of itself a distinct gain, for it means education. What the commonwealth needs is enlightenment, and after this will follow necessary laws and their enforcement.

Fertile Crosses of Teosinthe and Maize.

PROFESSOR A. DUGÉS sent in 1888 to the Cambridge Botanical Garden, Cambridge, Massachusetts, several Maize plants which he collected at Novo Leon, Mexico. Seed was sown at the Garden, and the resulting plants were studied by the late Dr. Sereno Watson.* Seed from the second generation of the Cambridge plants was procured and planted in Philadelphia, developing into Corn, which formed the basis for the botanical description of Maize in *Maize: A Botanical and Economic Study*,† published in part second, volume first, Contributions from the Botanical Laboratory of the University of Pennsylvania. Later inquiries were made of Dr. Dugés concerning his discovery, and the following letter in French and dated Guanajuato, September 22d, 1895, was received:

The maize which Dr. Sereno Watson named Zea canina, after the examples which I sent him, is known in Mexico as "Maiz de Coyote" (Lupus latrans), "Teosinthe," "Asesé," or "Café de Tabasco." We have considered it as Euchlæna luxurians, Euchlæna Mexicana, or Reana luxurians. It appears that it has been cultivated in Europe and also in Mexico, where it has been grown by Professor José C. Segura, Director of the School of Agriculture at Mexico. This botanist discovered at the end of three years of careful cultivation in good soil that it changed to Zea mays, and that if abandoned to itself under adverse conditions it reverted to Zea canina; that is, the same plant has a wild and a cultivated state. You are at liberty to address on my part Professor Segura, who will be pleased to give you the details.

Some time elapsed after the receipt of the above letter, when a letter was addressed to Professor Segura, of the School of Agriculture, Mexico, who replied in Spanish, under date of July 2d, 1896:

In reply to your letter, the manifest which I sent you with the bags of seed explained that one bag contained seeds of Asesé (Euchlæna Mexicana); another seeds obtained by hybridizing Euchlæna Mexicana with common Maize. In consequence, that which you term Zea canina, Watson, is not, but the result of the hybridization of asesé with Maize. To obtain this product, which is known in Guanajuato under the name "Maiz de Coyote," and which you classify with maize, sow three grains of the Asesé, and at a distance of 0.80 m. three grains of Maize. As a result of the sowing in the month of July, the Asesé commences to shoot out its floral peduncle, which should be cut off immediately after it appears [emasculation]. In August, when Indian Corn flowers, the Asesé is fertilized with pollen of Corn.‡ Harvest in October, and the grains, upon examination, do not show any modification in their form. The succeeding year sow the seed and a plant of early habit will result, showing, in its small-sized ears, qualities and appearances produced by the fusion of the ears of common Maize with the ears of the Asesé, grains of which I have sent you.

Kernels of both Teosinthe and Maize were sown in Philadelphia and the result of the planting watched with interest. Before the plants had fully matured I went to Mexico and visited Professor Segura at the National School of Agriculture. Professor Segura became very much interested and showed all the stages in the hybridization of Teosinthe with Corn, and very generously placed at my disposal a series of specimens, permission at the same time being given to publish the results of the experiments.

Professor Segura has been carrying on his experiments for the last five years. Maiz de Coyote was for a long time known in Guanajuato as a very peculiar form, whose origin was unknown. Professor Sereno Watson, to whom specimens were sent, described them as a new species, Zea canina, not recognizing them as of hybrid nature.

The writer, who believed this form to be primitive, and Professor Watson were both misled. Professor Segura discovered its origin by accident, some very peculiar plants having been found in a crop harvested from a field where Corn and Teosinthe had been planted together. He wisely experimented and conclusively demonstrated that Maiz de Coyote was not specifically distinct, but of hybrid origin.

Teosinthe, Euchlæna Mexicana, Schrad, is a plant of several varieties native in Mexico, where the writer found it growing wild in the Barranca Chica, near Guadalajara. It is grown as a fodder-plant in most warm countries, seldom flowering when planted in Europe. The two ranked ears are clustered in the axils of the leaves, and have the one fertile and one rudimentary flowers placed in a hardened cup-shaped depression of the rhachis. The male spike, terminally borne, consists of two flowered spikelets, with three stamens each in every flower. When Teosinthe is crossed with Maize by the use of Maize pollen, the hybrid progeny of the first generation shows a shortened branch in the axil of a leaf with three or four ears clustered together and surrounded by leaves which are commonly called husks. These ears resemble very much those of Teosinthe in that they are two ranked with the kernels in the hardened depression of an enlarged zigzag rhachis, which shows the beginning of a cob-like axis, on which, in this case, the grains are disposed in a distichous manner. The kernels are larger, sharp-pointed and protrude between the chaffy scales (glumes) from the cup-shaped depression of the axis, which is, in this case, shallower than in Teosinthe. The outer glume, which is hard in Teosinthe, becomes larger and softer in the hybrid progeny. The axis is still firm, glossy and chitinous. The second year, Maize pollen is again used to cross with the hybrid plants of the first generation. The result of this cross is a form of ear in which the kernels are larger, fuller and more rounded, while the corneous basin-shaped depression has become smaller and more shallow. The kernels in this generation are usually arranged in a distichous manner. The third year, pollen of Indian Corn is again used, and the resulting ears are found to differ in the increase of the number of rows of grains, four or more being present; the pithy axis, or cob, now becomes demarcated, and is seen when the ear is broken transversely. The plants of this year and of the fourth are evidently those described by Professor Watson under the name Zea canina, and as primitive ones by myself.

A very fair, but reduced, illustration of the ears of the fourth hybrid generation is to be found in the publication referred to in the foot-note, plate xv., fig. 9, of the monograph on Maize already referred to. The kernels of this generation are somewhat top-shaped, three-eighths of an inch long, white and sharp-pointed. The ears are usually clustered together on a shortened branch, although in some cases one ear may have taken the lead, having several smaller ones at the base, as is to be found frequently in ordinary Field Corn, when the husks are carefully removed.

What, then, is the nature of Corn? Several views may be taken by the light suddenly thrown upon the origin of the plant by these interesting cross-breeds or hybrids.*

(1) That Maize is generically and specifically a distinct plant. This is the view accepted by systematists and the one current in botanies and floras generally.

* Watson, *Proc. Amer. Acad. Arts and Sci.*, xxvi., 158.

† Review, 1894, Garden and Forest, vii., 28.

‡ It should be noticed here that the two plants are monœcious and protandrous; the order of flowering is as follows at Mexico: Male flowers of asesé, then female flowers of asesé and male of corn produced synchronously, then female flowers of Maize, so that the physiological arrangements in both plants in Mexico preclude the use of pollen of asesé in the fertilization of Maize.

* Up to this point the results of the cross have been termed hybrids, because the view was taken for clearness that two distinct species were used. We now designate according to the theory proposed the unions of two different varieties, as cross-breeds, of two different species, as hybrids.

(2) That Maize, as we now know it, owes its origin to the crossing of Teosinthe, as one of the parents, with the pollen of an extirpated closely related grass, and that the progeny of this cross by variation under cultivation produced ears of considerable size, with kernels of great nutritive value. If this hypothesis is accepted, then the proposition is proven that many species, which are botanically recognized as such, have had a hybrid origin, as, for example, the contested case of Bartram's Oak.

Dr. J. M. Macfarlane's observation as to the possible origin of species from hybrids is apropos:

Hitherto it may be said that authorities, with few exceptions, have declared wholly against the view that hybrids may be sufficiently fertile, and their progeny sufficiently strong and adaptable to be fitted for survival, not to say increase, in the struggle for existence. The admirable experiments conducted by Wichura on Willows go far to prove, one would think, that by the fourth or fifth generation enfeeblement and decay become so marked that continued production fails. But against this is to be placed the fact that many of our horticulturists are ardent believers in the continued fertility of hybrids, as witness the article by Professor Meehan, already cited, although we believe an oversanguine expectation is sometimes entertained under this head.*

When one finds the undoubted hybrid between Geum rivale and G. urbanum, frequently described by systematists as a species, and that in many places the hybrid is nearly or quite as abundant as either parent, that it freely produces good seeds, and further that it has, as we have already indicated, many points of superiority as a combined organism which neither parent possesses separately, we have good reason for the exercise of caution before pronouncing decisively against species production from hybrids.

(3) That Indian Corn is the result of a cross between Teosinthe and a race or variety of the plant produced by successive cultivation of the wild plant until its characters as a variety or a race have become fixed. This may have taken place under irrigation, where the conditions of growth are more or less under absolute control. It is probable that the early cultivation in Mexico began as a shallow scratching of the soil for water distribution, and that the early cultivation was near the springs and watercourses. As many of these rise in the hills, hill or mountain culture was the first practiced. The wild plants, therefore, chosen for such cultivation would under such feeble farming tend to vary but slightly from the original form. As the population, however, grew more dense and the water privileges possible through this imperfect system of irrigation more restricted, new methods of engineering were of a necessity adopted by the primitive husbandman. Deeper and longer ditches were dug, reservoirs constructed and cultivation in the lower-lying levels thus became possible through better water distribution and impounding. That this was the way in which cultivation by irrigation began is proved by the ancient irrigating works to be found on the hills long since abandoned. Such are to be found in Seriland, according to the observations of Professor W. J. McGee, of the Bureau of Ethnology † With the more extensive cultivation in the valleys through a better regulated water-supply, the plants naturally lost their feral characters and became more and more domesticated in appearance. It is at this point in the culture of plants, when agricultural methods have become more or less stable, tnat the fixation of certain races or varieties of field plants may be said to have taken place. Such a fixation of Teosinthe, as an agricultural race, may have taken, or probably did take, place. It was then that the presupposed cross between Teosinthe and its variety occurred. That this cross would produce some interesting results is corroborated by the behavior of other plants. Spontaneous hybrids are, as a rule, much more variable than those produced artificially—for example, Verbascum lychnitis × Thapsus and V. lychnitis × nigrum. Professor Bailey ‡ says:

You want varieties quickly, and they must be distinct. You turn at once to hybridization. Hybridization is nominally rare. There is no proof that nature made a species or potent form in this way.* But she mildly crosses one species with itself, and out of the slightly variable offspring selects those which are best adapted to the place in which they live, and uses them for the subjects of another congenial cross, and so the family marches on from generation to generation, each step slow, but each one sure.

It is probably in such a manner that our cultivated Corn, originally a cross breed,† may have arisen.

The specimens which were grown in Philadelphia during the season of 1896 from seed of the fourth hybrid, or, according to the last view expressed, fourth cross-bred generation, followed, in their vegetative parts, the horticulturist's rule,‡ that

Crosses of different races and species are distinguished from plants of a pure race, as a rule, by the power of vegetation. Hybrids between very different species are often very weak, especially when young, so that it is difficult to successfully raise the seedlings. On the other hand, crosses of more closely related species and races are, as a rule, uncommonly luxuriant and strong; they are distinguished mostly by size, rapidity of growth, early flowering, abundance of flowers, longer life, stronger reproductive power, unusual size of some special organs, and like characteristics.

The Philadelphia plants reached a height of twelve feet, grew rapidly, were of long life and produced at nearly all of the nodes below the ears strong aerial roots.

If we consider Indian Corn to have arisen as a cross-breed, or hybrid, we have an explanation as to many of the teratological specimens of Corn frequently found in field and garden cultivation. These teratological appearances may be explained by reversion, or may be simple malformations. It is a well-known fact that malformations and curious forms are much more common, especially in the flower parts of hybrids, than in individuals of pure descent.

In conclusion, if the latter supposition is the correct one, it is probable that the wild ancestor of Maize is the Teosinthe, Euchlæna Mexicana, because nature avoids hybridization on account of the sterility of the offspring, thus generally precluding the possibility of a cross between two distinct genera or species, and, secondly, because it is found by common experience that the fertility of a plant is increased by crossing two varieties of the same species which have been produced under differing conditions, or in different geographical localities, such as would be found in the case of Teosinthe and the agricultural race produced through successive advances in methods of irrigation. If the above view is not accepted, the fact that Teosinthe and Maize can be crossed and a fertile progeny result shows that the two plants are united by the close and intimate bonds of kinship.

University of Pennsylvania. *J. W. Harshberger.*

* 1892. *Transactions Royal Society of Edinburgh*, xxxvii., 283.
† *Science, N. S.*, iii., 493.
‡ 1896. L. H. Bailey, *The Survival of the Unlike*, 177.

* Vide ante.
† Vide ante, foot-note.
‡ 1895. L. H. Bailey, *Plant Breeding*, 225.

Landscape Effects at Kew.

THAT part of Kew which formerly was known as "The Wilderness," or Pleasure-grounds, and which is now designated The Arboretum, consists of about one hundred and eighty acres of what is now by far the most picturesque scenery in the gardens. In 1850 Sir William Hooker was instructed to take charge of it and form "an arboretum, or classified collection of hardy trees and shrubs on a scale worthy of the nation." It was then "a large area of wooded and scrubby ground devoid of interest or picturesque effects"; it is now richly stocked with trees and shrubs from all parts of the world, and at the same time it is "a paradise of trees and song-birds, shady glades, well-planned vistas, bold sweeps of green lawns, and set in the midst of it a lake whose banks and islands are so skillfully planted with tastefully grouped tree and shrub and herb that artists of repute spend months in making pictures of the views it affords. The lake was made by

Sir William Hooker about forty years ago, and any one looking at it now, with its undulating banks and mounds, would find it difficult to realize that it was once perfectly flat ground. The islands and banks are so designed that the extent of the lake cannot be seen from any one point. Its area is about five acres, and it is supplied by water from the Thames, which runs close by, separating Kew from its once famous neighbor, Syon Gardens, the demesne of the Duke of Northumberland.

The conifer garden extends all along the south side of the lake, while placed about its margin is the collection of Willows, the Alders being conspicuous on some of the slopes. Large trees of Oak, Elm, Poplar, Lime and Chestnut are prominent features in the views to be seen from various points. In the water itself, or fringing the margin, are Irises, Sedges, Docks, Reed-maces, Water-lilies, etc. There are also numerous water-fowl, which undoubtedly add to the charm of the scenery, although at the expense of many aquatic plants. A collection of Marliac's hardy Nymphæas is being made a feature of at one end of the lake. In the summer Daffodils, Poet's Narcissus, Primula Japonica, Spiræas, etc., help to give beauty to the scenery.

About two years ago two eminent painters, Monsieur and Madame de l'Aubinière, came to Kew, and, falling in love with its lake scenery, they painted a large number of pictures representing its various views. These, with the permission of the authorities, have since been exhibited in a small gallery in the gardens. Recently, twenty-four of the most suitable of these pictures have been reproduced by a photographic process, and these, with an introduction from the pen of the Director, Mr. Thiselton-Dyer, are now issued in the form of an album entitled The Poetry of Kew Gardens. One of the pictures is reproduced on page 525. The following extract is from the introduction:

"Visitors to Kew who admire its stately trees, its sylvan glades and its spacious lawns, probably in most cases suppose that Nature endowed it with its charms, but this is far from being the case. Kew throughout is the creation of the art of the gardener, applied continuously for a century and a half, and never, even at the present day, ceasing to modify, develop and refine.

"Landscape-gardening as exemplified in such a domain as Kew is peculiarly English. It originated, no doubt, partly in an intelligent appreciation of the possibilities afforded by the climate, which allows smooth turf to grow in a manner unknown in other countries; partly in the demand for giving to country mansions harmonious and sympathetic surroundings. Its evolution has been gradual, and it is not without interest to notice that Kew has been the scene of the earliest attempts of its successive masters. . . . There seems reason to believe that in the main features, which still survive, it was the work of Kent, who has been termed the founder of the school of landscape-gardening. 'Capability Brown' was also employed by the Dowager Princess of Wales to remodel the western half of the gardens, and Kew owes to him some beautiful features, among them the beautiful Hollow Walk, now devoted to Rhododendrons."

Kew may be taken as an excellent example of what can be done to make a rich botanical collection and at the same time a garden filled with picturesque scenery. In the words of Mr. Dyer, it proves 'that it is possible to construct a great botanic garden which shall sacrifice nothing to its object and yet be neither arid nor ugly."

London. *W. W.*

Each of us is constituted with a special idiosyncrasy related in some mysterious way to certain ideas of natural scenery, and when we find ourselves in a scene answering to our idiosyncrasy the mind feels itself at home there and rapidly attaches itself by affection. The influence of scenery upon happiness is far greater than is generally believed. There is a nostalgia which is not exactly a longing for one's birthplace, but a weary dissatistaction with the nature that lies around us, and a hopeless desire for the nature that we were born to enjoy.—*Philip Gilbert Hamerton.*

Foreign Correspondence.

London Letter.

Begonia Baumanni.—Although introduced from Bolivia six years ago and described and figured as a large-flowered, sweet-scented tuberous Begonia, this species has somehow failed with us as a garden plant. It has been tried every year at Kew without success until this year, and then it was only by very careful treatment that it was got to anything like perfection. Is there any special "wrinkle" in its cultivation? I have read that it is grown well by American cultivators. Here the tubers have been started at the same time and treated along with the other Andean species, Boliviensis, Veitchii, etc., but they did nothing. A plant planted in a bulb-house in a bed of light soil near the glass grew and flowered well, and a figure of it was prepared for *The Botanical Magazine*. It has fleshy reniform leaves; the nerves, petioles and stems are colored rose-red and the scapes are a foot high, bearing three or four flowers, the males with four petals and three inches across, the females with five petals and two inches across. They are colored rich rosy red and are very sweet-scented. Has any one crossed it with other tuberous species?

Conandron ramondioides.—We have just repotted our plants of this pretty little Gesneriad from Japan, and I am reminded to call the attention of American cultivators to its merits as a pot-plant. It has a short, fleshy stem or rhizome, clothed with long, soft brown hairs. The leaves are oblong-lanceolate, not unlike those of the common Primrose, and they form a cushion-like tuft suggestive of the Pyrennean Ramondia, a near relation of Conandron. Unlike the Ramondia, however, they are glabrous and deciduous. The flowers are borne in cymes on slender suberect scapes six inches long, and they are star-shaped, an inch across, and colored rose-red with a darker zone round the eye-like clusters of orange-colored stamens. In its regular perianth this plant is singular among Gesneriads. The flowers are developed profusely in June, July and August. At Kew it is grown in a cool, airy house along with Cape bulbs, where, this year, it was a delightful little picture when in flower. It likes an open light soil and plenty of water all through the summer. It was introduced by Veitch through their collector, Maries, about eighteen years ago, but is still a rare plant.

Jacobinia coccinea.—Among the numerous Acanthads grown for their flowers in winter this is one of the handsomest. It has smooth cylindrical stems, glossy green glabrous, ovate-lanceolate, long-stalked leaves from three to nine inches long, and erect terminal spikes of bright crimson flowers springing from ovate green bracts. The flowers are tubular, slightly curved, two inches long and divided at the top into five segments, the two upper ones forming a sort of hood to the stamens, the three lower spreading and labellum-like. Grown from spring-struck cuttings in a sunny frame or greenhouse during the summer, bushes with about half a dozen stems eighteen inches high are obtainable; or the plants may be limited to a single stem and thus induced to make exceptionally strong flower-spikes. There is a comparatively worthless plant in cultivation under this name. The true thing is figured (poorly) in *The Botanical Magazine*, t. 432. It is a native of Brazil. We had some plants of it in flower in October. This and the best form of Jacobinia magnifica, sometimes called Pohliana, are two of the best Acanthads we grow.

Crassula rubicunda.—This is a good winter-flowering greenhouse plant. It has been attractive at Kew since the middle of November, and it promises to continue so until Christmas. It forms a compact little shrub fifteen inches high, the stems erect, branching naturally from the base and again near the top, where it forms a broad, loose, dichotomous cyme or head of flowers which measures nine inches across. The leaves, which are about four inches long, are arranged closely upon the stem from the

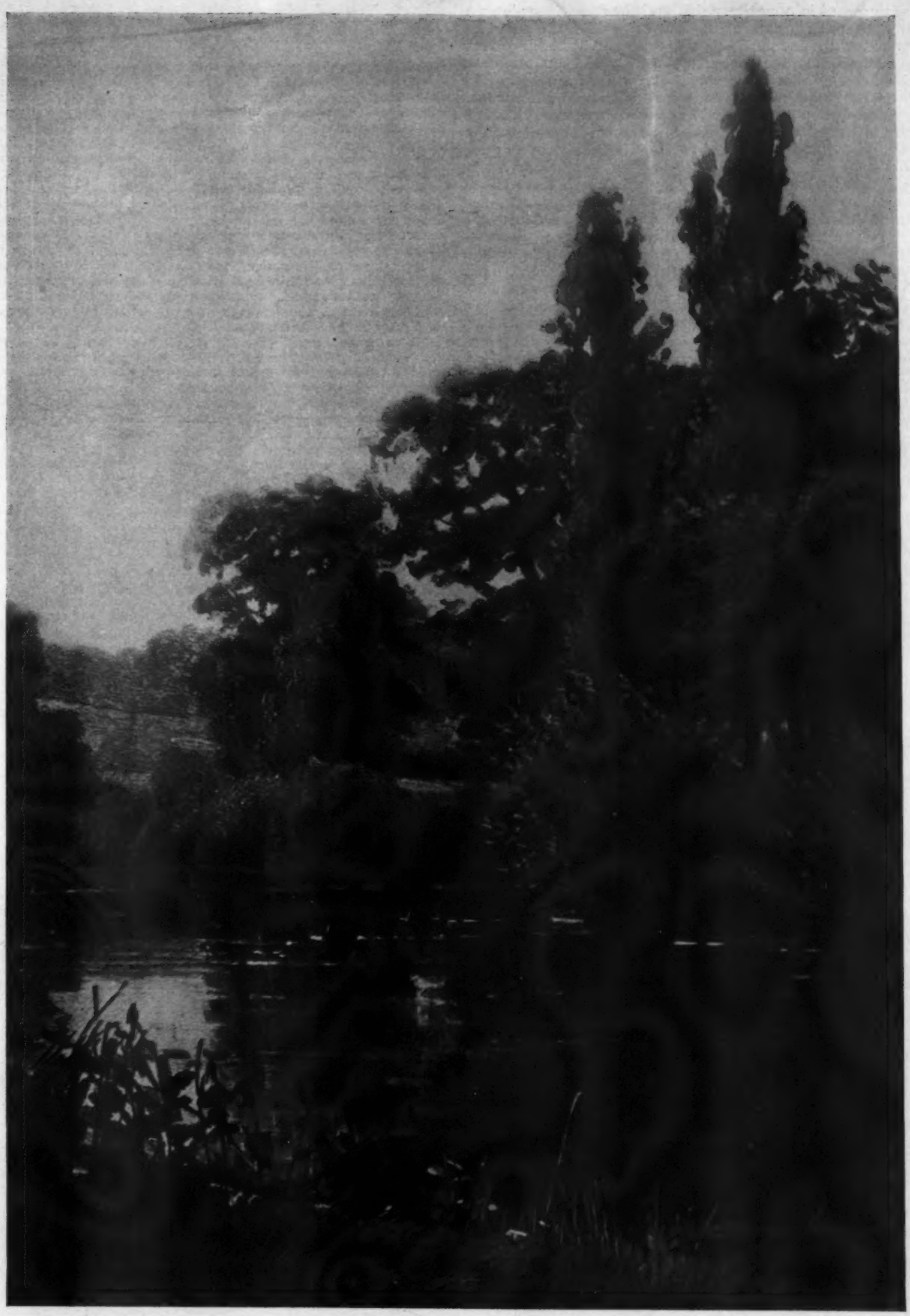

Fig. 75.—View in the Royal Gardens, Kew.—See page 523.

base upward in opposite pairs, and they are linear-lanceolate, channeled, succulent, bright green, the margins clothed with fine hair-like spines. The flowers are very numerous, and they are erect, urn-shaped, a quarter of an inch across, colored crimson, with yellow anthers. The leaves root freely and produce young plants in a few weeks if placed upon a pan of moist sand in a warm house. Grown along with and treated the same as the popular Crassula coccinea, this plant would, I believe, prove a good market plant. It was first introduced from south Africa by Mr. Wilson Saunders, and flowered in his garden at Reigate over twenty years ago, but it has not yet attracted the attention of horticulturists. This may be due to the fact that a much smaller and less attractive species—namely, C. impressa—has been grown by the nurserymen and in the parks here under the name of C. rubicunda. This also is a native of south Africa. It forms compact little tufts, three or four inches high, of erect slender stems, bearing semiterete, purple-tinted, pock-marked leaves two inches long and small terminal heads of dull red flowers. Another name for this plant is C. Schmidtii (see *Gartenflora*, t. 1225). A third species of somewhat similar character is C. recurva, introduced to Kew from Zululand along with Streptocarpus Dunnii. It has fleshy stems a foot high, thick, recurved, down-clad leaves and terminal heads of dull red flowers. When grown in bright sunlight the whole plant becomes a rich vinous-red color. Another good winter-flowering greenhouse species is the old C. lactea, of decumbent habit, with fleshy heart-shaped leaves and erect racemes of pure white flowers. C. falcata is also deserving of general cultivation for the conscrvatory in midwinter.

Greenhouses in December.—There are so few really good plants that are to be relied upon to flower under glass in December that a list of them is surprisingly short. The Orchid-houses are, perhaps, the richest in flower display, although, except Dendrobium, Phalænopsis, Cattleya labiata and the forms of Lælia anceps and autumnalis, we have nothing additional to what there was twenty years ago. Odontoglossum crispum is always in flower. Cypripedium insigne is good in December, as also are the Calanthes, Oncidium varicosum, O. Forbesii, Cattleya maxima, Angræcum eburneum and Phalænopsis of sorts. In the stove Brownea Crawfordi is magnificent; hybrid Anthuriums, Poinsettias, Euphorbia jacquiniæflora, Begonia Socotrana, B. Gloire de Lorraine, B. Winter Gem, B. President Carnot, Ruellia macrantha, Jacobinia coccinea and Costus igneus are the chief attractions on the stages. Among climbers the best are Ipomœa Horsfalliæ and its varieties, I. rubro-cœrulea and Manettia bicolor. The cooler houses look dull after the departure of the Chrysanthemums. Of course, there are forced flowers, such as Roman Hyacinths and Narcissus and the useful Cineraria, Primula Sinensis, Bouvardias, Arums, Persian Cyclamen and various Ericas and Epacrises. Less common plants in flower now are the Reinwardtias, Mackaya bella, Tecoma Smithii, Luculia gratissima, Pleroma macrantha and several species of Statice from the Canary Islands. The most attractive climbers are several species of Bomarea, Senecio macroglossus, Hibbertia dentata and Lonicera sempervirens. A few Nerines remain, but the best of these were over more than a month ago. Hæmanthus albiflos is worth growing for its drumstick-shaped heads of white flowers developed at this time of year. These are the pick of the flowering plants in our houses in December. Expert florists, both English and foreign, who grow for our market, produce quantities of scarlet Anemone, Carnation, white Lilac, Lilium Harrisii, Tea Roses, Tuberoses, Pyrethrums, Acacia dealbata and scarlet Pelargonium, which are to be seen in quantity in the London flower-shops in December. Here it is difficult to induce plants to flower at a season when the sun does not shine for days together, the dull leaden sky giving place at times to heavy fog, which in London is so poisonous as to destroy most of the flowers that struggle into being.

London. *W. Watson.*

Cultural Department.

Tomatoes Under Glass.

TWO crops of tomatoes may be grown under glass in a single season. Seeds for the first crop should be planted the last week in July. A good method is to pot off the young plants as soon as they are large enough to handle, in two or two-and-a-half inch pots, and plunge them in a bench of coal ashes, where they can remain for three or four weeks. Then the plants may be shifted to four-inch pots to remain until planted in the benches of the forcing-house the latter part of September. The period in which the plants occupy the four-inch pots is a time when the care and handling is of great importance, and will tell on the following crop, not because of lessened or increased vigor of the plant itself so much as in obtaining a form that will admit of training to produce the largest crop in the smallest space. The plants should never be allowed to become "drawn." Drawn plants will often produce large crops in the field, but under glass, and especially if trained to a single stem, it is desirable to have the first cluster of flowers and fruit as near the ground as possible, and this cannot be from drawn plants. Plants become drawn from being overcrowded or grown in too high a temperature and where there is an absence of light. The best plants for setting that I have ever seen were held back and not forced while in four-inch pots. Kept in a cool house where the night temperature was between 50 and 55 degrees, and ten degrees higher in the daytime, the plants made a slow and stocky growth and blossomed about the time they were set in the benches. These plants were of the Lorillard variety—which is about the best for winter growing—and on all the plants the blossom clusters, and later the fruit clusters, were only a few inches from the ground. Many of the plants produced seven clusters on a stem, which was pinched off at a distance of between five and six feet above the bench.

After setting the plants, the house may be kept moist but should be dry enough for the purposes of pollination during the period while the fruit is setting. I am inclined to believe that hand pollination is profitable. In a small house, 16x40, and containing 160 plants, about fifteen minutes is required to go through the operation, a spoon and stick being used. The operation should be repeated each day or every second day throughout the season or until the stems are full.

Plants set in the benches October 1st should begin to produce ripe tomatoes the 1st of December, and the fruits will continue to ripen for about two months.

Seed for the second crop should be sown in flats about the middle of December, and the plants will be ready to set in the benches early in February. Ripe tomatoes may again be harvested during the latter part of March and through April. This crop will give a larger yield than the first. The increased amount of light, and therefore heat, causes the individual fruits to grow larger.

The soil commonly used for forcing tomatoes is prepared by composting turf with from one-fourth to one-third its bulk of good stable manure. This makes a good soil. Tomatoes may be grown successfully in a soil composed of coal ashes, either anthracite or bituminous, with three per cent. (by weight) of peat moss added, both ashes and peat being sifted through a screen with four meshes to the inch.

Plant food in some form must be added to a soil of coal ashes, and this can be done most easily with chemical fertilizers. To each 100 square feet of bench area should be added four and three-quarter pounds of nitrate of soda, two pounds of muriate of potash, one pound of dissolved bone-black, one and one-half pounds of carbonate of lime.

The lime is added for the purpose of neutralizing the slight acidity of the peat moss. In three successive crops grown at this station, where both kinds of soil were used—the natural soil, both with and without chemical fertilizers—the greatest yield each time came from the soil of coal ashes and peat moss. The fruit from the artificial soil scarcely varies from that grown in natural soil either in form, size, color, or chemical composition.

By keeping off all lateral shoots and tying to a string, more plants can be used, and a yield of two pounds per square foot of bench area may be obtained.

Plants may be grown from cuttings as well as from seed, and this method is practiced by some growers. It has been my experience that cuttings produce fruit earlier than seedlings, but the yield is much smaller. For this reason seedlings are to be preferred.

The benches should be eight or nine inches deep in a tomato house. The house should be kept at a temperature

ranging between 65 and 70 degrees, Fahrenheit, during the night and about ten degrees higher in the daytime. The walks should be wet down every day to keep the atmosphere moist, but it is not necessary to syringe the plants.

Forcing-house tomatoes are liable to be affected by two common fungous diseases—Cladosporium fulvum and Macrosporium tomato. The former is the "mould" or "blight" of the field, and often attacks the plants in the fall, when they are first set in the benches, and again in the spring, when the heat has been turned off. The upper surface of the leaves affected with blight has a spotted appearance, and the under side of each spot will be covered with a brownish mould which becomes darker-colored as the spores are produced. Repeated applications of Bordeaux mixture or ammoniacal carbonate of copper will free the plants from this parasite.

The Macrosporium is known as "rot" and attacks the fruit. This disease is not so easy to check; it first appears as a brown or black decayed spot at the blossom end when the fruit is about half grown. Probably the disease attacks the tomato through the pistil of the flower and the mycelium continues to develop in the ovary, which rapidly increases in size and becomes half grown before the disease is apparent. The decay usually continues until the tomato is about half destroyed. If the spores of the fungus enter through the flower, as is supposed, any application of fungicides that would kill the spores would also have a tendency to kill the pollen, if not to injure the pistil of the flower, so that until more is known about this disease it is hardly safe to advise spraying to hold it in check. It is seldom serious, however, if the proper conditions prevail in the forcing-house.

Winter tomatoes are attacked by a white fly-like insect known as the "Plant-house Aleyrodes" (Aleyrodes vaporariorum). The larvæ may be found upon the under surface of the lower leaves during the bearing season of the plants and the adults will be seen flying about and depositing eggs toward the tops. Fumigating the house occasionally will hold this insect in subjection.

An eel worm or nematode, Heterodera radicicola, forms galls upon the roots of tomatoes grown in the forcing-house. The usual remedy is to use fresh soil each season and throw the old out to lie over winter and freeze. Nematodes are not found upon the roots of tomato plants grown in a soil of coal ashes and peat moss.

Instead of growing new plants for the second crop, the old ones may be cut off a foot above the bench, turned down, and buried in the soil. New shoots will be thrown out, and these will produce a fairly good crop of fruit. The old root-system is again used, and though the plants will grow vigorously, the crop can hardly be expected to equal that obtained from new plants, especially if nematodes are troublesome. Where these worms are abundant, it is probably better to grow new plants. The price of hot-house tomatoes is a variable quantity. Last winter, in New Haven, the crop sold at thirty-five cents a pound, wholesale, during the holidays. Toward spring the price was considerably less. At present thirty cents is about as much as the dealers like to pay. Whether the crop is a profitable one or not depends upon circumstances, but tomatoes can doubtless be grown at a profit near good markets, and especially by market gardeners who wish to keep a part of their help employed the year round. These men know the markets, and can dispose of the crop at an advantage, where others might fail.

Experiment Station, New Haven, Conn. *W. E. Britton.*

Begonias.

AT this season, when showy greenhouse plants are scarce, and the gorgeous display of Chrysanthemums is missed, winter-flowering Begonias are useful for the conservatory. New and old varieties can be had in abundance so that the most fastidious taste can be satisfied. In grouping Begonias in conservatories several plants of one kind ought to be grouped together to produce the most pleasing effects. Well-grown plants of B. Froebeli, a tuberous-rooted species, can hardly be excelled by any that blossom at this season or perhaps at any season. It has not as large individual flowers as some of the tuberous-rooted kinds that bloom in summer, but its flowers are as rich in color as those of any other Begonia. They are brilliant scarlet, and are produced in drooping cymes on red peduncles which are more than a foot long when the plants are grown well. But the flowers are not the only attractive part of this plant; it has handsome foliage, the leaves sometimes measuring more than one foot in length and six or eight inches in breadth, the upper side velveted with the finest purplish hairs. It has been in cultivation twenty-four years, but is seldom seen in gardens although seeds are offered annually in the catalogues. Perhaps one of the reasons why it is not oftener grown is because in raising it from seed the young plants do not produce as large flowers or leaves as older ones. The best flowers are obtained here from tubers several years old. The cultivation of this beautiful Begonia is very simple. When the flowering season is over and the leaves begin to lose their color, water should gradually be withheld. After the plants have lost their leaves, then the pots and tubers may be put on a dry shelf where they can remain until they show signs of growth in the fall. The old soil is then shaken away from the tubers and then they are repotted into smaller pots. When they have grown until the young roots have penetrated the fresh compost and reached the sides of the pots they should have a shift into a larger-sized pot. A compost of turfy loam, leaf-mold and sand suits this Begonia.

Begonia Socotrana makes a good companion to B. Froebeli, and about the same treatment suits them both. A well-grown group of these plants is a sight not easily forgotten. B. Haageana is also in flower now; in fact, it is almost a constant bloomer. It is easily grown and makes fine bushy plants bearing large clusters of showy blush-white flowers. Its leaves are metallic green with red nerves and of a purplish color on the under side. The flowers are borne on long stout peduncles, and their outer segments are covered with red hairs. B. Credneri is a hybrid rather like the last species in habit and producing immense clusters of showy flowers.

The most floriferous of Begonias at this time is B. incarnata. It is a well-known plant and is grown by almost every one who has a greenhouse. The rose-colored flowers are produced very plentifully and brighten the plants for a long time in winter. Young plants that were raised from cuttings made last spring are nice flowering plants now. B. semperflorens gigantea rosea could hardly be spared from our greenhouses, now, with its large dark green shining leaves and numerous stout erect panicles of bright vermilion flowers. It is easily grown, and raised in spring makes nice blooming plants now. A near relative of this good Begonia is B. Ameliæ, another profuse bloomer, but having flowers not quite as large as those of B. semperflorens rosea. A good dwarf pot plant is B. Bruanti, with small obliquely lobed leaves and many flowers borne almost without cessation on short axillary peduncles. This Begonia also makes a useful bedding plant in summer. The old and well-known B. fuchsioides, when well grown, is as pleasing and as useful as any other. Although it makes a good pot plant it is always seen at its best in a bench or border with its stems trained to a pillar or a stake where its Fuchsia-like flowers, in drooping branched panicles, are displayed to best advantage. Many more could be added to the list: B. Abundance, B. argenteo-guttata, B. Corbeille de feu, B. Saundersii, B. nitida and its white variety, B. phyllomaniaca, besides newer kinds which are plentiful now and many of them in flower at this time.

Harvard Botanic Garden, Cambridge, Mass. *Robert Cameron.*

Orchid Notes.

THE present time is a critical one in the cultivation of Orchids. It is the resting season of a great many varieties, and water should be withheld to a certain extent with only an occasional syringing, applied as the pseudo-bulbs begin to show shriveling. An overabundance of water now might result in that much-dreaded disease, the spot. A great number of Orchids are destroyed by overwatering during this season.

During the winter months, while the most beautiful of winter Orchids are in flower, a superabundance of moisture should be carefully guarded against, as it certainly will prove destructive of the beauty of the flowers. The house in which they grow should only be dampened on bright, sunny days, or when heavy firing is necessary to maintain the proper temperature, and this should not exceed sixty-five degrees during the day. The floor should be allowed to become quite dry toward evening and the temperature should be reduced to about fifty-five degrees. Where it is possible, a small house should be reserved for the Orchids as they come into flower. They can then be grouped with other flowering and foliage plants to produce a pleasing effect, and the temperature can be kept dry and cooler in order to preserve the flowers longer. After they are done flowering, repotting should be attended to. The best time for this work is during their resting season, except in the case of varieties which bloom as they make their new

growth. Every plant should be examined, as some may need more material in order to have them firm in the pots and baskets, even if they do not need to be repotted. In repotting fill the baskets and pots three-quarters full of new charcoal, which is better than crocks, as it does not become sour. Care should be taken not to destroy any more of their adventitious roots than can possibly be helped, and it is essential to guard against overpotting. Good fibrous peat that has been thoroughly washed and free from dirt and insects should be used. Press in the peat as firmly as possible and use no moss with it, as this soon decays and becomes sour. A light layer of moss on the top of the peat is beneficial. It encourages the tender roots and does not become sour as it does when packed in with the peat. Another very important point is to see that the plants are thoroughly washed of all dirt and insects, for cleanliness in every respect is a cardinal point in successful Orchid culture.

After repotting, the temperature should not be raised too quickly, as this will tend to start an early growth, which will be finished before fall, when a second growth would be liable to take place, and this will weaken the plant and cause inferior flowers. The increasing brightness of the sun during the early spring months will necessitate shading to guard against burning. For this purpose some prefer dimming the glass with a mixture of driers and oil. Others use whitewash; others still use shades of small slats. The former is a good practice, but it requires much labor to clean off the glass in late autumn. Shading with cheesecloth or light muslin, arranged so that it can be conveniently lowered during sunny days and rolled up during cloudy weather, is convenient. It gives an equal shading throughout the house and breaks off the brightest of the sun's rays. The glass does not retain the heat as it does when painted, and the house will be several degrees cooler under cloth. As the Orchids begin to show their new growth a greater amount of moisture and watering will be needed. An occasional dipping, when the pseudobulbs are about half-grown, in a very mild solution of cow-manure will be beneficial in producing strong growths.

While some of the richest and most delicately colored flowers of some varieties are at their best during these few months, it will be interesting work to cross a few varieties, as there is no telling what the seed may produce in a few years hence. It requires much patience to raise some Orchids from seed. Select only strong plants of the best varieties when crossing in order to obtain good fertile seed. The seed-pod generally ripens in from eight to twelve months, and needs watching toward the time of ripening, or it will burst and much of the seed will be lost.

The seed should be sown as soon as ripe in pots prepared specially for the purpose. California peat is a good material for these pots, as it is fine in fibre, and the seed will not settle very far into it. The seed should be sprayed only after it is sown, as heavy syringing washes it away. After the germination and a leaf or two are seen the seedlings should be transplanted into very small pots. We have now a seedling Cattleya which has been flowering for the past five weeks, besides several Cypripediums, which are worth describing.

Tarrytown, N. Y. *William Magee, Jr.*

Cypripedium bellatulum.

THE genus Cypripedium may be said to consist of three well-marked divisions, though but one of these is generally admitted—the tropical American kinds grouped under the name Selenipedium. These are easily recognized by their long foliage without marking, and the pollen is dry and powdery and not of the wax-like consistency common to all Cypripediums from the east; there is also a structural difference in the seed-capsule, and various smaller details make a dividing line between those that come from the east and west. The Cypripediums proper, most of which have beautifully tessellated leaves, are natives of the islands of the Malay Archipelago, where they occur mostly in isolated spots, two species rarely growing together, and also of the mainland of the East Indies, reaching up through Burma and into the Shan states, whence came our most recent acquisition, C. Charlesworthii, sent home by a British officer fortunately possessed of botanical knowledge and taste.

The section of the genus, however, to which reference is specially made now is that which embraces Cypripedium bellatulum, C. niveum, C. Godefroyæ and C. concolor, with their several varieties. These are distinct in having flowers of a uniform ground color, from pure white to various yellowish white shades; in the great width of petal, the outer segments of the flowers being equal, or nearly so, and in the markings of spots instead of stripes. The foliage of this division is also strikingly individual, being thick and fleshy, tessellated, and not of such large dimensions as in the other sections. The flower-scapes are always dwarf.

This last section presents as great difference, from a cultural point of view, in the plants themselves. And while separating them botanically is not usually practiced, the cultivator, if he wishes to grow these gems, must be most careful to give them suitable treatment, or they will speedily be classed among the things that were. Hybridists were quick to note the striking characteristics of this section, and soon began to use them. Some of the most interesting results have already been obtained, and it is impossible to predict what is in store, so that it is not so much on account of the species mentioned, as the hybrids that have been raised from them by crossing with other species, all of which partake, to a great extent, of the habit of growth of Cypripedium bellatulum or its kindred. These hybrids are now among the most prized in collections, and it is essential to understand their requirements.

It has often been stated in published descriptions of these plants that they grow on lime-stone rocks, and that the addition of this material to the potting compost will greatly facilitate their growth. We have no lime-stone in this district, but old mortar refuse is an excellent substitute, as well as useful to keep the potting soil sweet and porous, and it is well to use it as drainage for the pots. If newly imported plants are received, it will invariably be found that a deep red clay of a most tenacious nature is adhering to the thick roots. We find even now, after a year or two of watering, that this red earth still sticks to the roots that are alive and sound. This fact set us to thinking about the usual peat and moss compost generally advised, and prepared us somewhat for a later experience—that of finding in some of the noted English collections whole shelves near the roof-glass filled with these Cypripedes, all in most vigorous health, and potted in loam alone, with the addition of lime-stone. The fact is our moss compost holds too much moisture in suspension for the plants, if it is kept in a growing condition, as with other Cypripedes; and if the moss is allowed to die it is even worse, for the plants like to be in a fairly dry condition before water is given. If a few pieces of loam-fibre are placed at and around the collar of the plants it will be found ample for their needs, and water must never be given until it is really needed, or damp will take off even the strongest plants.

Another point to be observed, and it is the most important of all, is to suspend the plants where they will never be watered or sprayed over the foliage. However they may be placed in a wild state, whether in clefts or fissures of the rocks, or if the moisture is rapidly evaporated by the air, certain it is that we must not apply it overhead. It is an easy matter to use pots of exactly the same height, putting several of them together in a basket and dipping them in a vessel of water when dry; no danger of decay at the base of the leaves need then be feared. It is the only difficulty to be apprehended, and one, too, that has prevented many from taking up the cultivation of this exquisite set of plants.

Plants newly received have most likely come by way of Europe, and our experience, which is also that of others, is that thrips are very certain to be present. These destructive little pests seem inseparable for some time, because water cannot be applied so freely as with other species. Strong tobacco dust, a pinch in each growth, will discourage them in time, and fumigating may also be resorted to, as this whole genus will not take harm from the operation.

It is not too much to say that Cypripedium bellatulum at least should be grown in every collection, however small. It is also the easiest to obtain, presents great variety in itself, both in the leaves and flowers, and will almost surely lead one to want other species, as they present, taken altogether, a series of gradations that point to one common origin, though some are insular while others grow on the mainland, far in the interior. The gem of the series is a spotless form of C. bellatulum, discovered by Commissioner Moore, who also found C. Charlesworthii. The foliage is also devoid of color other than green, and this fortunately led to its being kept separate by its discoverer.

Chemical fertilizers for Orchid culture is a delicate subject, and many cultivators denounce their use in strong terms. We have, however, for some time used them in homœopathic doses, and in some instances with surprising results. We have no hesitation at this time in saying that a little nitrate of soda or sulphate of ammonia, or, better still, both alternately used as a weak solution for watering, will give depth of color to the leaves and vigor not to be had under other treatment. This

is mentioned for the purpose of experiment by cultivators of an inquiring turn, rather than by way of refutation of the published opinions of other cultivators.

South Lancaster, Mass. *E. O. Orpet.*

Correspondence.

Coöperation in Flower-growing.

To the Editor of GARDEN AND FOREST:

Sir,—Previous to the organization of the Boston Coöperative Flower Growers' Association in 1892, near-by growers for market made sales direct to the retail stores, carrying their flowers with them and making a daily canvass of the business portion of the city. In this toilsome work much time was wasted. There was no means of gauging the supply and demand, and prices had a very unsatisfactory basis. No agreement existed among growers, and between buyer and seller it was often a contest of wits; neither the grower nor the buyer expected to get nor to give what the other demanded. It was noon when the tired travelers returned, and often after a valuable lot of flowers had been disposed of for half their real worth. Another method, still in practice to some extent, was to make consignments to commission-men. Every one who disposes of his produce in this way puts himself in the commission-men's power. He must trust them implicitly, and though they may be, and in most cases are, honest, there is always some uncertainty as to returns.

Eventually the growers came together and drew up articles of agreement. These were signed at a meeting held in Horticultural Hall on October 18th, 1892, and a charter was obtained some time later. The market was opened on the first of November of the same year, when an auction sale for space was made, at which the corporation realized $225.00 in premiums above stated rentals. The market has been successful from the start. The retail stores ignored the combination, and treated those who remained out of it with extreme consideration. But the provision of a meeting-place, the establishing of a standard of value and of a shelter during winter proved decided advantages, and three-fourths of the market growers are now in the association, including all the best ones. Prominent among stand-holders are William Nicholson, of South Framingham, the Carnation specialist; Joseph Tailby, his son William, being one of the original promoters, treasurer, clerk, an auctioneer; Peter Ball, of Malden, Roses; Fisher Brothers, Montvale, Carnations, Asparagus and Ferns; W. H. Elliott, Brighton, who makes a specialty of Asparagus plumosus nanus, and ships it to all parts of the country; Mann Brothers, Randolph, known as the introducers of Mutual Friend Chrysanthemums and growers of fine bulbous stock; F. Matheson, Waverly, Roses; William Edgar, Waverly, fine Chrysanthemums and Mignonette.

With the gain of the association in numbers and importance it became difficult for the best stores to get first-quality stock, and this predicament was taken advantage of by the few growers who were not members of the association. The stores were at last forced to patronize the market for protection, and its prices now rule.

The market is now held under the Park Street Church; every available foot is rented, and the enterprise pays well. The rules of the market allow only growers to sell, and commission-men are excluded. At the time of my visit, between six and eight in the morning, I was surprised at the quantity and quality of the stock sold and the shortness of time in which it was disposed of. The bulk of the business is done within an hour. It had been my impression that the street fakir was an adjunct of the stores, buying left-over stock. This, I find, is not true. Even the fakir knows a good thing. Though he wants only second-class stuff, he wants it fresh. He barters long and patiently, but always pays cash, and therefore is a welcome visitor. Really he is a benefit to the trade rather than an injury. He deals in stock the storekeepers would not buy and the grower could not otherwise dispose of, and sells to a class who would not go into the stores to buy. Nothing is sold at retail, and what is left over is held by the manager for sale during the day.

Wellesley, Mass. *T. D. Hatfield.*

Recent Publications.

A report on *The Culture of Hemp and Jute in the United States*, by Charles Richards Dodge, Special Agent, has just been published by the Department of Agriculture. Practically very little fibre from either of these plants is now produced in the United States. Thirty-seven years ago 75,000 tons of hemp were grown, while last year only 5,000 tons were reported for the whole country. The decline in the production of hemp dates back, primarily, to the decline in American shipbuilding; it was hastened by the introduction of Manilla hemp, and later still by the importation of jute. Additional falling off in production is due to the decline in prices for hard-cordage fibres, such as sisal and manilla, through overproduction stimulated by the high prices of these two fibres five or six years ago. The Department of Agriculture began to interest itself in extending the cultivation of Hemp in 1890, when the consumption of binding twine amounted to 150,000 tons a year, and it was then shown that if one-half of this twine were made from home-grown hemp, instead of from manilla or sisal, there would be a saving to consumers and an advantage to American farmers amounting to nearly two million dollars a year. The effort then made to revive the North River hemp industry in this state failed, and it has suffered a decline in Illinois, where much low-grade hemp was once grown for binding twine. To this rather gloomy history are added interesting notes on soil, seed, harvesting, etc., both in this country and abroad. Nearly three hundred patents have been issued in the United States for machines for breaking hemp, many of which have proved failures, and none have fulfilled the essential requirements, so that the Kentucky Hemp grower of to-day relies on the rude and clumsy handbrake of his grandfather's time, a device similar to the one still used by the Hemp farmers of Brittany. Satisfactory machinery would, no doubt, give a great impetus to the cultivation of this fibre. It is doubtful, however, whether hemp will ever be used again in the manufacture of coarse-woven goods, since cotton is so cheap that it has superseded both hemp and flax in common manufactures. Hemp has probably no future use except in the rougher manufactures—that is, for the cheaper kinds of cordage and twine, although it may be fit for bagging. It is doubtful if hemp can ever be produced so as to compete with jute-butts, but its larger employment in cordage manufacture ought to enable it to recover a part of the ground it has lost as an American fibre industry. A rough product that could be cheaply produced would be good enough for binding twine, and might be employed with advantage in the cheaper grades of small cordage now made of imported jute because of its superior strength and less liability to deterioration when stored for any length of time.

Although hemp is a stronger and better fibre than jute, and although its cultivation is fully understood here, it is a fact that the large present demand for India jute would insure a ready market for American jute if it could be raised here in quantity. Nearly five million dollars' worth of jute fibre was imported into this country for manufacture during the last year, and yet it is perfectly adapted to cultivation in the southern states, and its large yield per acre ought to make it a staple production. It is used for weaving into fine and coarse fibres, for making twines and cordage and in the manufacture of paper. A limited experience in cultivating the plant in this country seems to prove that jute of an excellent quality can be grown here. On proper soils and with our improved implements in preparing the ground an American farmer ought to count upon three thousand pounds an acre, but here, too, the success will largely depend upon the use of machinery for extracting the fibre. The southern farmer could hardly meet the demand for cheap jute, but might, perhaps, through the demand for higher-priced fibre at prices which he would be able to realize in competition with the Indian product. After all, the question of economical production of jute in the United States is not yet practically solved. It has been demonstrated that the plants will grow luxuriantly in many parts of the south, and that the bark contains fibre of excellent quality, and the prospect warrants careful experimentation with a view to ascertaining the actual cost of growing this crop and of extracting and baling the fibre. The subject is such an important one that inquiries in relation to the

matter are constantly sent to the Department of Agriculture, and although there is nothing in the situation to encourage any extravagant expectations, it is certainly one worthy of study in these times when the rewards of agriculture are so small, and when it would be a great advantage to the farming population, especially of the south, to add another one to their small list of profitable crops.

Notes.

A correspondent of the *Strawberry Culturist* says that he treated a lot of Strawberry-plants in matted rows which were badly rusted, by spraying them with borax lye, a material used for soap-making, using one can to a forty-gallon barrel of water. This arrested the rust and kept the plants growing, so that berries were picked from these beds ten days after the unsprayed plants had quit bearing.

Two years ago a florist near Boston exhibited a variety of Antirrhinum majus which was conspicuous for its long stems, furnished throughout with flowers of a singular pure white and large size. We believe it is the same plant that is now called Giant White, and it blooms as freely out-of-doors as any of the Snapdragons, but when grown in pots for winter decoration of windows and conservatories it is a singularly useful plant. The flowers are fragrant.

A recent number of *The American Agriculturist* gives a picture of a cluster of the McPike Grape, of which we have spoken in a previous number. The photograph shows that the berries are of the largest size, while they are said to be of better quality, finer flavor, and with fewer seeds than the Worden, of which this Grape is a seedling and which it resembles in general appearance. The foliage is said to be large and the joints shorter than in the parent plant, and the clusters ripen very evenly.

The number of species of plants which have become extinct is very large, and yet generic groups rarely die out. Comparative researches show that much the greater proportion of plants whose remains have been preserved in a fossil condition from earlier geologic periods belong to the genera which are represented by plants now living, although many of these existing plants differ specifically from the earlier ones. From this it seems that new types are outgrowing the old ones constantly and take their place in the general scheme of life.

Mr. W. H. Bristol, of San Bernardino County, California, has now five acres of Logan berries, and before a late meeting of the Southern California Farmers' Institute he showed photographs of the fruits, which were larger than any blackberry. The plant has a trailing habit like that of a Dewberry and grows sometimes fifteen feet in a single season. The berry is of a bright dark red, with a flavor which can hardly be described in words, but is said to be something like that of a red raspberry, though more tart and sprightly. For jellies and jams it is altogether unsurpassed.

In recent years about sixteen per cent. of all the bananas brought to this city came from Cuba, twice as many from Jamaica, and the remainder from Aspinwall, Port Limon and other Central American ports. During the last five months none of this fruit has come from Cuba, since foreign vessels are not allowed to visit interior ports of the island, and the bananas, brought in carriers and transferred to steamships at Gibara, on the northern coast, were badly bruised and unfit for transportation. The imports for 1896 are, however, as heavy as those of last year, when more than four and a half million bunches were sold in this city. The shipments of this fruit from Jamaica are much larger than heretofore. The rich red bananas which formerly came from Baracoa, Cuba, are now entirely out of our markets. Bananas from Port Limon now command the highest price at wholesale, bunches of the largest size selling for $1.20 each by the truck-load, those from Jamaica for $1.15, and from Aspinwall for $1.00.

During the fortnight before Christmas, West Street, for a half mile above the Fall River boat-landing, was packed with eighty-five car-loads of Christmas trees, the majority being Balsam Fir, with some Spruce. Although the Spruce trees are more bushy and handsome, the Firs are in greater demand, because they are more open and so require less decoration. About thirty-five car-loads came from the Catskills and fifty from Maine, besides two thousand bundles carried on a schooner. The demand was this year fairly good, especially for the smaller sizes. Seventy-five cents was the average price for bundles of trees six, eight and ten feet in height, there being two or three of the larger trees in each package, and as many as five to seven of the shorter ones. Large, shapely trees sold at from $5.00 to $30.00 apiece, and trees thirty-five feet high brought $35.00 each. The prepared trees are hauled to the railways in hayracks, where they are loaded on platform cars and cost nine cents a hundredweight for freight to New York.

A correspondent of the *Springfield Republican* calls attention to the fact that many wealthy men in various parts of the country are getting possession of large blocks of forest land, either as permanent investments, as game preserves or places of summer residence. Leaving aside the immense tracts set apart by the National Government and by the state of New York in the Adirondacks and the Catskills, clubs and private individuals now own nearly a million acres of forest preserves in this state, while in Maine, especially in the Rangely Lake country, in the upper White Mountains of New Hampshire, and along the tributaries of the Connecticut and Androscoggin rivers there are many large preserves. Blue Mountain Park, which was established by Austin Corbin in the south-western part of New Hampshire, covers thirty-two square miles, while the estate of Mr. George W. Vanderbilt, of Biltmore, contains a forest of 100,000 acres, which will be the field of systematic experiments in practical and scientific forestry. Of course, there is no guarantee that these great tracts will remain permanently in forest, and yet the reservation of forest land as such, whether by single owners or by associated membership, is a hopeful sign of the future.

Selected Spitzenburg apples, and a limited supply of Newtown pippins, from Vermont, are now the best varieties seen in the fancy-fruit stores, where highly flavored and showy red apple sells for thirty-five to fifty cents and the more costly pippin brings seventy-five cents a dozen. The cold weather of the past week seriously interfered with the fruit trade here, all sidewalk and other outdoor stands being closed. The wholesale apple market has been crowded, too, with stock that in milder weather would have remained on the docks. Wholesale prices for large lots range from seventy-five cents to $2.00 a barrel for fair, prime and fancy quality New York State fruit of such varieties as Greening, Baldwin, King, Northern Spy and Spitzenburg. The market abroad is even more depressed. Messages received last Monday from dealers in Glasgow, Liverpool and London by Otto G. Mayer & Co., of this city, exporters, state that thousands of barrels of American apples have been left on the docks in England for ten days past. Many have been sold for as little as a shilling a barrel, and four shillings is all that can be got for the best fruit. Canadian and Boston apples have suffered most, but the glut is unprecedented and ruinous to all American shippers.

Sir Henry Dering, one of the diplomatic officers of Great Britain in Mexico, has made an interesting report to the Foreign Office in regard to the economic plants of that country. Ginger, Zinziber officinale, which was introduced into America as early as 1540, is now found, according to Sir Henry, growing wild in many parts of Mexico. Not only are the dried rhizomes used as a spice and a medicine, but the fresh or green rhizome, washed, scraped and preserved in syrup, or cut in pieces in candied sugar, is well known as a sweetmeat. The plant is propagated by division of the rhizomes, each piece being planted three inches deep and cultivated like a potato. The sets are covered with well-rotted manure, over which a thick layer of leaves is placed to retain moisture and give extra nourishment to the growing plants. Ginger is an exhausting crop, and therefore the land is kept thoroughly weeded and highly manured. The plant flowers in autumn, and in January the rhizomes are forked out of the soil and average from two to three ounces in weight. When lifted from the ground and cleaned of adhering dirt they are plunged into boiling water to destroy their vitality and then dried in the sun, when they present a brown wrinkled surface. To produce the so-called uncoated ginger the epidermis is scraped from the rhizome, which is subjected to some bleaching, generally from the fumes of sulphur, and much of the commercial ginger is practically whitewashed to give it a better appearance. This often, however, covers an inferior quality, and can be detected by the ease with which it rubs off. Good ginger, when not whitewashed, is of a pale buff color, breaking with a short mealy fracture and presenting bristly fibres on the surface. Uncoated ginger is considered the best for ordinary use. The returns from an acre of land vary, of course, but, under favorable circumstances, the crop ought to be 4,000 pounds or more.